

**JOINT**  
**PUBLIC NOTICE**

**CHARLESTON DISTRICT, CORPS OF ENGINEERS**  
**69A Hagood Avenue**  
**Charleston, South Carolina 29403-5107**  
**and the**

**S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL**  
**OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT**  
**1362 McMillan Avenue, Suite 400**  
**Charleston, South Carolina 29405**

REGULATORY DIVISION

Refer to: P/N #2004-1R-218-P (Modification)

May 19, 2006

Pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1344), and the South Carolina Coastal Zone Management Act (48-39-10 et seq.) a modification to an application has been submitted to the Department of the Army and the S.C. Department of Health and Environmental Control by

**MARLIN QUAY MARINA**  
**C/O ANASTASIA SHAW**  
**GENERAL ENGINEERING & ENVIRONMENTAL, LLC**  
**POST OFFICE BOX 30712**  
**CHARLESTON, SOUTH CAROLINA 29417**

to install a bulkhead/breakwater adjacent to

**MAJOR ACTIVITY**

MAIN CREEK

at Marlin Quay Marina on Garden City Beach, Georgetown County, South Carolina (Latitude: 33.55210; Longitude: 79.02017).

In order to give all interested parties an opportunity to express their views

**NOTICE**

is hereby given that written statements regarding the proposed work will be received by both of the above mentioned offices until

**12 O'CLOCK NOON, MONDAY, JUNE 5, 2006**

from those interested in the activity and whose interests may be affected by the proposed work.

The proposed work consists of installing a steel sheet pile bulkhead/breakwater where the top of the sheet piling will approximately 7.0 feet above MLW. Treated wood decking will be placed on top of the bulkhead/breakwater. The purpose of this modification, according to the applicant, is to protect the marsh grass and oyster beds adjacent to the proposed dredged area on the northwest side of the marina.

**NOTE:** Plans depicting the work described in this notice are available and will be provided, upon receipt of a written request, to anyone that is interested in obtaining a copy of the plans for the specific project. The request must identify the project of interest by public notice number and a self-addressed stamped envelope must also be provided for mailing the drawings to you. Your request for drawings should be addressed to the

**U.S. Army Corps of Engineers  
ATTN: REGULATORY DIVISION  
69A Hagood Avenue  
Charleston, South Carolina 29403-5107**

The District Engineer has concluded that the discharges associated with this modification, both direct and indirect, should be reviewed by the South Carolina Department of Health and Environmental Control in accordance with provisions of Section 401 of the Clean Water Act. As such, this notice constitutes a request, on behalf of the applicant, for certification that this modification will comply with applicable effluent limitations and water quality standards. The work shown on this application must also be certified as consistent with applicable provisions the Coastal Zone Management Program (15 CFR 930). The District Engineer will not process this application to a conclusion until such certifications are received. The applicant is hereby advised that supplemental information may be required by the State to facilitate the review.

This notice initiates the Essential Fish Habitat (EFH) consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Implementation of this modification would impact estuarine substrates and emergent wetlands utilized by various life stages of species comprising the red drum, shrimp, and snapper-grouper management complexes. Our initial determination is that the proposed action would not have a substantial individual or cumulative adverse impact on EFH or fisheries managed by the South Atlantic Fishery Management Council and the National Marine Fisheries Service (NMFS). Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the NMFS.

Pursuant to Section 7(c) of the Endangered Species Act of 1973 (as amended), the District Engineer has consulted the most recently available information and has determined that this modification is not likely to adversely affect any Federally endangered, threatened, or proposed species or result in the destruction or adverse modification of designated or proposed critical habitat. This public notice serves as a request for written concurrence from the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service on this determination.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), this public notice also constitutes a request to Indian Tribes to notify the District Engineer of any historic properties of religious and cultural significance to them that may be affected by the proposed undertaking.

In accordance with the NHPA, the District Engineer has also consulted the latest published version of the National Register of Historic Places for the presence or absence of registered properties, or properties listed as being eligible for inclusion therein, and this worksite is not included as a registered property or property listed as being eligible for inclusion in the Register. To insure that other cultural resources that the District Engineer is not aware of are not overlooked, this public notice also serves as a request to the State Historic Preservation Office to provide any information it may have with regard to historic and cultural resources.


Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for a public hearing shall state, with particularity, the reasons for holding a public hearing.

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the activity on the public interest and will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency (EPA), under authority of Section 404(b) of the Clean Water Act and, as appropriate, the criteria

Act of 1972, as amended. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the project must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the project will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production and, in general, the needs and welfare of the people. A permit will be granted unless the District Engineer determines that it would be contrary to the public interest. In cases of conflicting property rights, the Corps of Engineers cannot undertake to adjudicate rival claims.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this project. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the activity.

If there are any questions concerning this public notice, please contact me at 843-329-8044 or toll free at 1-866-329-8187.

  
Robin Collier-Socha  
Project Manager  
Regulatory Division  
U.S. Army Corps of Engineers

**(SEE CIVIL/SURVEY/PERMITTING  
DRAWINGS BY GEL)**

**(SEE CIVIL/SURVEY/PERMITTING  
DRAWINGS BY GEL)**

ALL EXISTING SURVEY INFORMATION, INCLUDING BUT NOT LIMITED TO, FLOATING DOCK LOCATIONS, MARSH LOCATIONS, OTSIEB BED LOCATIONS, AND GRADES HAVE BEEN PROVIDED BY GENERAL ENGINEERING & ENVIRONMENTAL, LLC (GEL) IN THE SURVEY BY MARK A. CORNELIUS, P.L.S. DATED MARCH 3, 2006

NEW BLUEHEAD/BREAKWATER OF COATED STEEL SHEET PILING (SEE 2/S1 THROUGH 5/S1 AND GENERAL NOTES)

A circular professional seal for the State of South Carolina. The outer ring contains the text "SOUTH CAROLINA" at the top and "REGISTERED ENGINEER" at the bottom, separated by two stars. The inner circle contains the text "No. 11136" in the center. The name "EDW. J. R. ARCHER" is written in a cursive script across the bottom half of the seal. A signature, likely "Edw. J. R. Archer", is written in cursive across the top half of the seal, overlapping the "SOUTH CAROLINA" text.

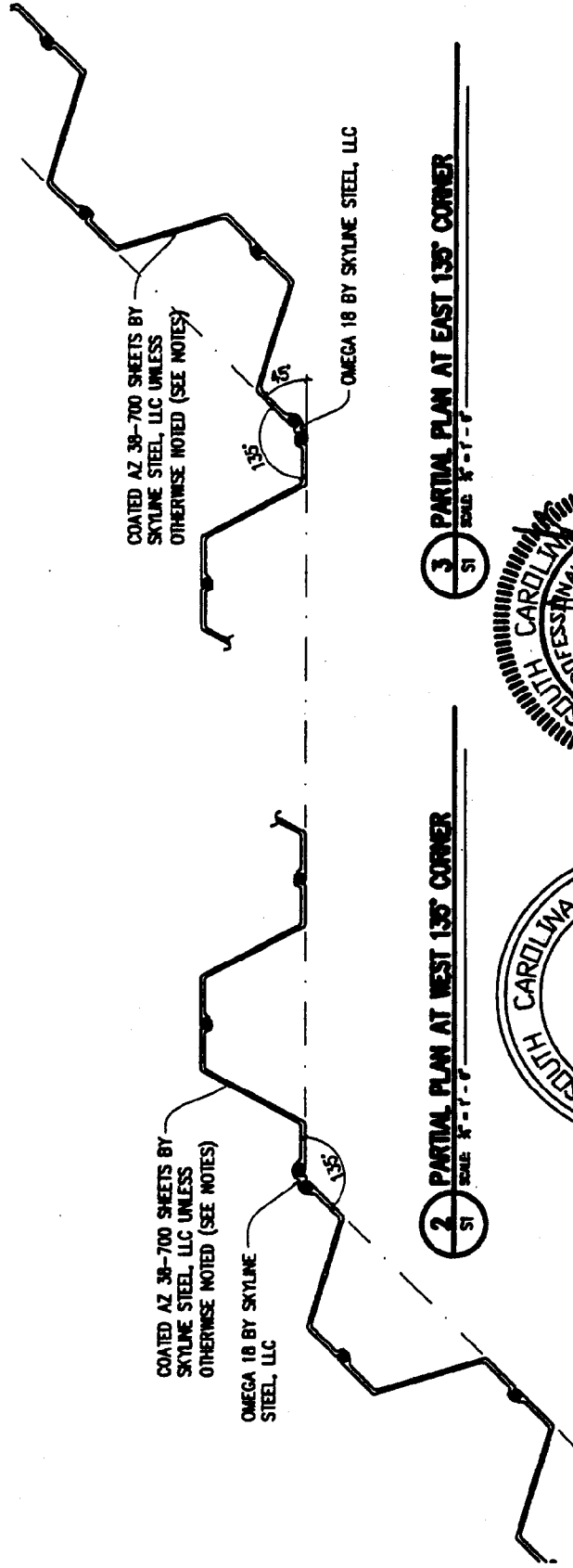
Marlin Quay Marina  
Georgetown County  
P/N #2004-1R-218 (modification)  
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**PARTIAL PLAN AT NEW BULKHEAD/BREAKWATER**

①

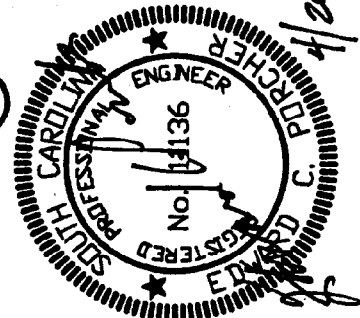
**PROPOSED DREDGE AREA -**  
**-7.0 MLW**

**(SEE CIVIL/SURVEY/PERMITTING  
DRAWINGS BY GEL)**

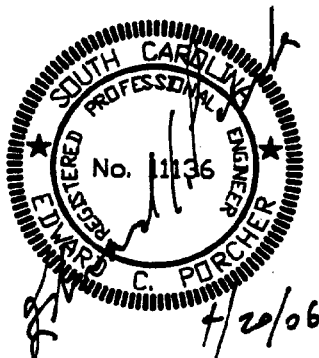
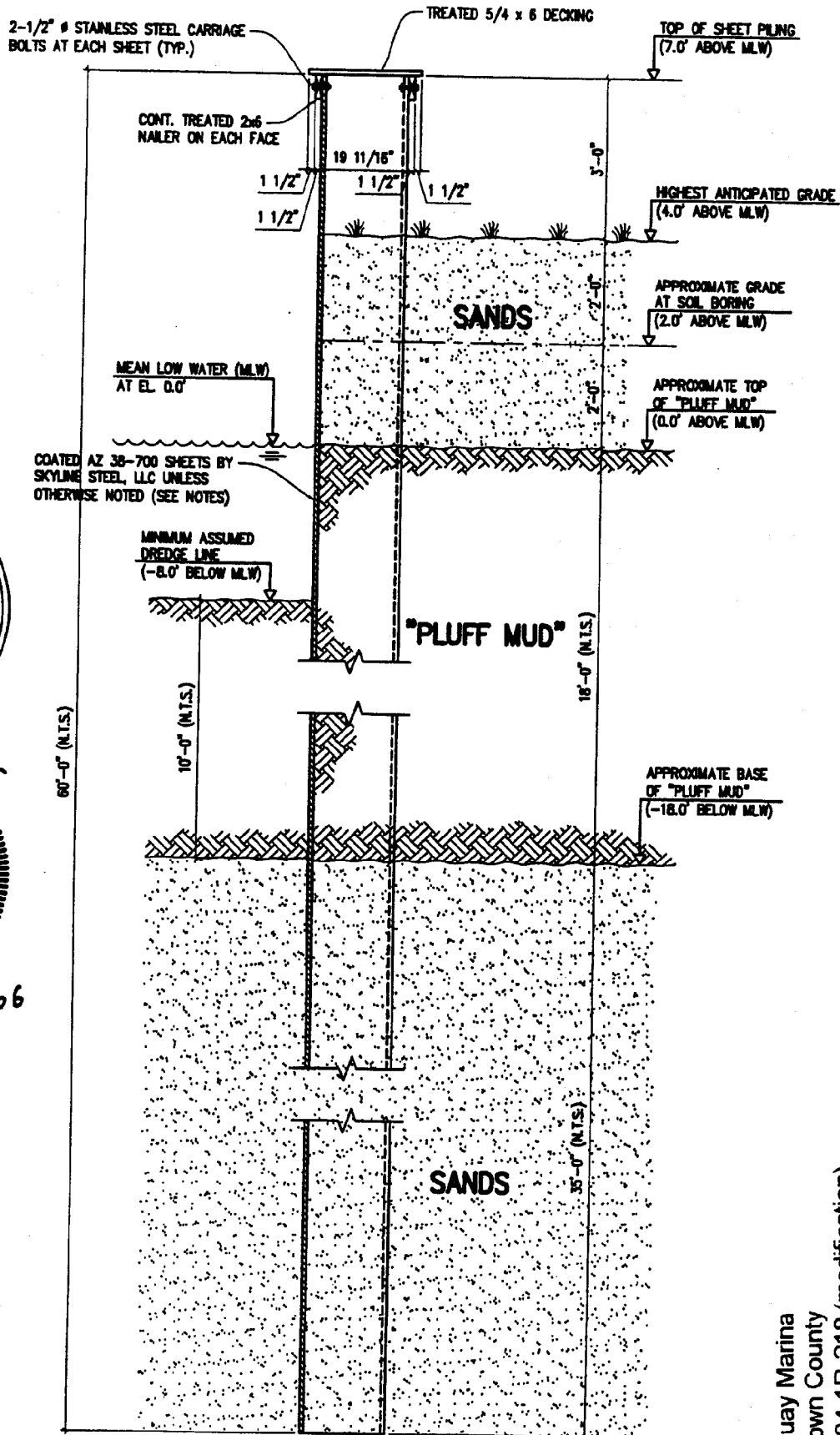


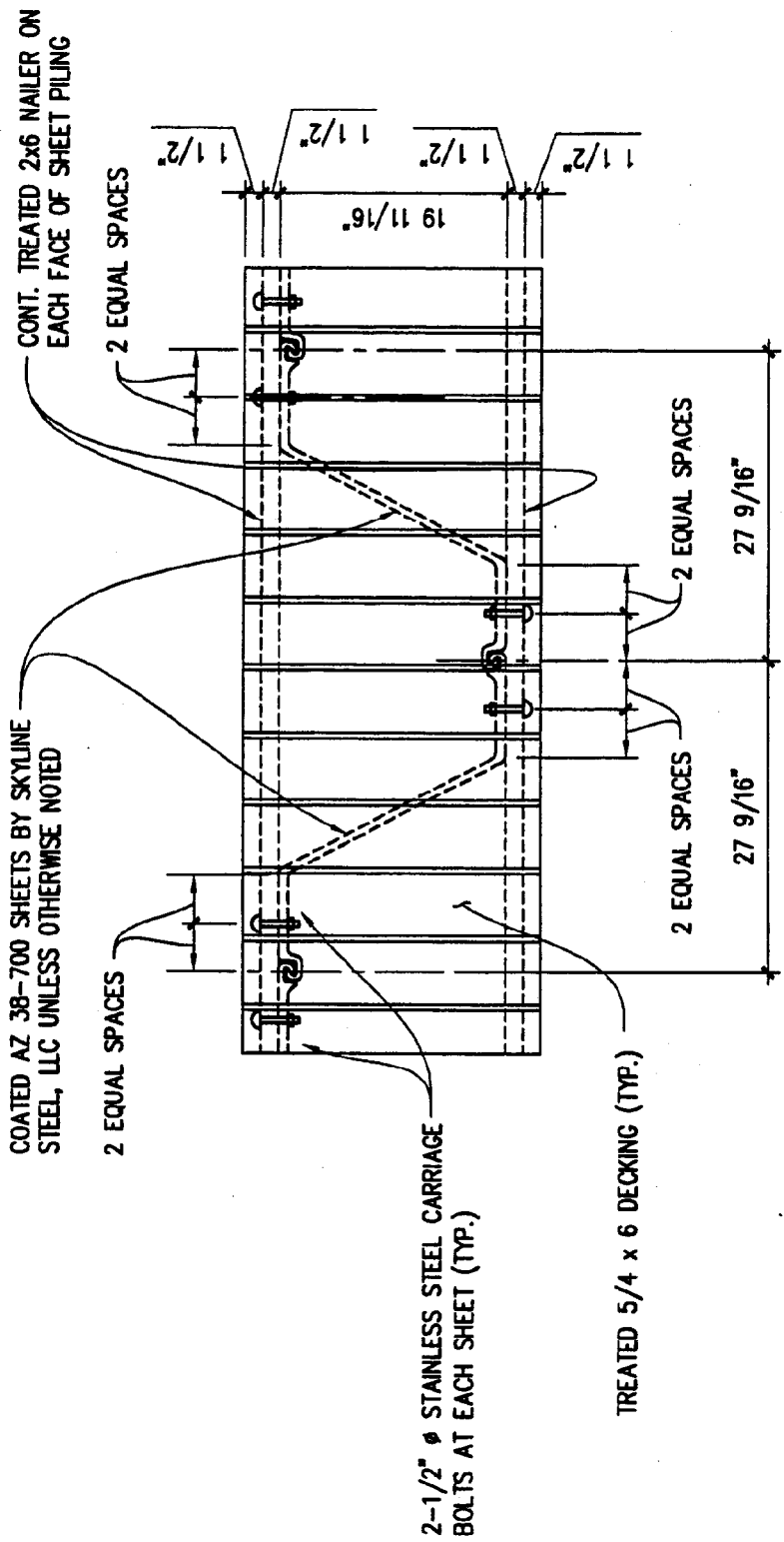
2 PARTIAL PLAN AT WEST 135° CORNER  
SI SCALE 1/4" = 1'-0"

3 PARTIAL PLAN AT EAST 135° CORNER  
SI SCALE 1/4" = 1'-0"



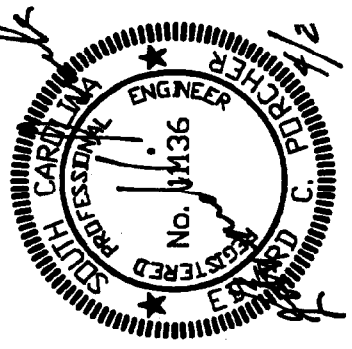
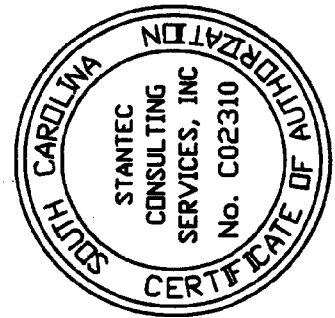
Marlin Quay Marina  
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Sheet 2 of 15





5 PARTIAL PLAN AT WOOD CAP ON  
S1 TOP OF BULKHEAD/BREAKWATER

SCALE: 3/4" = 1' - 0"



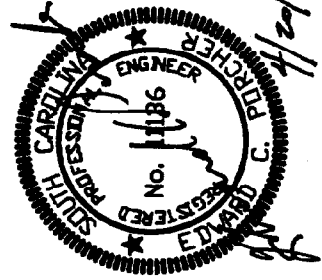
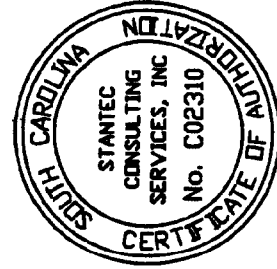
## GENERAL NOTES

### GENERAL

1. The responsibilities of Stantec Consulting Services, Inc. are limited to Structural DESIGN of the new steel bulkhead/breakwater. No other portions of the existing marina have been investigated, designed, or analyzed by Stantec.
2. All permitting, including bulkhead/breakwater locations and dredging requirements, shall be designed by others and are not the responsibility of Stantec. All work must be in accordance with approved permits.
3. All existing survey information, including but not limited to, floating dock locations, marsh locations, oyster bed locations, and grades have been provided by General Engineering & Environmental, LLC (GEL) in the survey by Mark A. Cornelius, P.L.S. dated March 3, 2006.
4. All materials for design, detailing, fabrication, and erection shall conform with ASTM, AISC, and AISC Codes and Standards, latest editions.
5. All dimensions and details must be field verified by the Contractor prior to fabrication of new materials. Any discrepancies shall be brought to the attention of the Engineer for review.
6. All shop drawings and submittals must be reviewed by the Engineer before fabrication of new materials.
7. The Contractor shall provide adequate bracing, shoring, and protection during construction, and he is responsible for any failures and damages due to the lack of such.
8. Extreme diligence and care shall be exercised by the Contractor to protect the site and adjacent properties. Any damages as a result of construction operations are the sole responsibility of the Contractor, and shall be either repaired or replaced at no cost to the Owner.
9. Workers, employees, and the General Public shall be protected by the Contractor. All OSHA and other applicable safety standards shall be adhered to by the Contractor during all work. Adequate safety nets, barricades, guardrails, safety lines, platforms, flag men, life vests, and other temporary safety devices shall be provided by the Contractor as required to protect all personnel and property. Any damages, accidents, or injuries as a result of construction operations are the sole responsibility of the Contractor.
10. Existing utilities, equipment, and other appurtenances conflicting with proposed work shall be protected, and relocated if required, by the Contractor as required to complete all work. Any relocating work shall be in accordance with applicable codes and standards.
11. Unless specifically noted in the drawings, specifications, or subsequent documents, any items to be removed by the Contractor shall be disposed of by the Contractor.
12. Items to be removed and reinstalled by the Contractor shall be adequately protected, adequately stored, and thoroughly cleaned by the Contractor prior to reinstallation.
13. Upon completion of all work, the Contractor shall clean up and remove from the site all surplus materials, tools, appliances, rubbish, protection devices, accessing materials, cleaning debris, equipment, and other foreign debris such that the site is left in a neat, orderly condition and ready for use.
14. After completion of the new bulkhead/breakwater, structural maintenance shall be the responsibility of the Owner. The Owner is advised that steel sheet piling in the harsh saltwater environment will require periodic cleaning and recoating with coal tar epoxy. Similarly, the wood cap will require periodic maintenance.

### FOUNDATION NOTES

1. See the Geotechnical Investigation Report by WPC Engineering, Environmental & Construction Services dated March 29, 2006 (WPC Project No. CHS-06-120) along with a subsequent email by Edward L. Hajduk, P.E. dated 04/12/06.
2. The Contractor is advised that the site may contain various rubble and other foreign debris which must be punched through and/or removed as required to complete all new work. Punching, spudding, and/or removal of normal foreign debris as expected in waterfront work are the sole responsibility of the Contractor.



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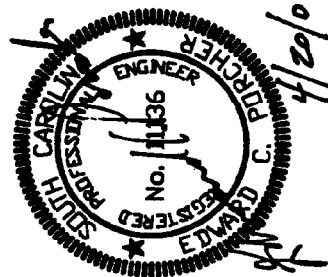
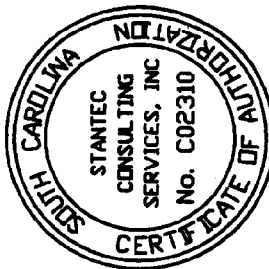


#### STRUCTURAL STEEL AND STEEL SHEET PILING

1. Design, fabrication, and erection must follow the AISC Manual of Steel Construction, ninth edition.
2. Unless otherwise noted, all steel members shall be of ASTM A572, Grade 50 steel or better.
3. All bolts shall be AISC, Type 316 stainless steel.
4. All steel sheet piling shall be coated, Skyline AZ 38-700 steel sheet piling by Skyline Steel, LLC of Parsippany, NJ. Sheeting properties shall be at least  $I=694.5 \text{ in}^4/\text{ft}$  and  $S=70.7 \text{ in}^3/\text{ft}$ .
5. All sheet piling shall be manufactured from ASTM A572, Grade 50 steel with a minimum yield strength of 50,000 ksi.
6. All sheet piling shall be thoroughly cleaned to a SSPC No. 10 "Near White" finish (with a 2 to 4 mil surface profile) and shop coated with at least 16 dry mils of Amercoat 78HB, amine cured coal tar epoxy or approved equal.
7. Shop drawings of sheet piling sizes, configurations, strengths, properties, layout, and coatings shall be submitted to the Engineer for review and coordination prior to fabrication and shipment of new materials.
8. Sheet piling shall be 60'-0" in length and driven to a butt elevation of 7'-0" above Mean Low Water (MLW).
9. All welding shall be executed by a certified welder to meet the requirements of the American Welding Society for welding structural steel of type as shown on the drawings. Welding electrodes shall be E-70 series.
10. All cutting or burning of the structural steel members not shown on the drawings shall be approved by the Structural Engineer before performing the work. The Contractor shall bear all the expenses of the cutting and the required reinforcing as directed.
11. All welded, abraded, or otherwise exposed steel shall be thoroughly cleaned and field painted with two coats of coal tar epoxy.

#### STRUCTURAL WOOD

1. Design, fabrication, and erection of structural wood shall follow the ANSI/AF and PA NDS-2001.
2. Unless otherwise noted, all wood shall be Southern Yellow Pine, No. 2, and preservative treated to ANPA Standards C22 or better to at least 0.6 lbs/cf of retention with CCA.
3. All joist hangers, hurricane ties, straps, and other metal connectors shall be stainless steel "Strong-Tie" connectors as manufactured by Simpson Company or approved equal.
4. All bolts, nails, screws, and other metal connectors shall be AISI, Type 316 stainless steel.



**Geotechnical Investigation**

**Breakwater at Marlin Quay**

**Marina**

**Garden City Beach, SC**

**WPC Project # CHS-06-120**

Prepared for

**Ms. Anastasia Shaw**

GEL, Inc.

2040 Savage Road

Charleston, SC 29407

March 29, 2006

Prepared by

**WPC**

1017 Chuck Dawley Boulevard

Mount Pleasant, SC 29464

**WPC**  
**WPC**

Marlin Quay Marina  
Georgetown County  
P/N #2004-1R-218 (modification)  
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ENGINEERING, ENVIRONMENTAL  
& CONSTRUCTION SERVICES

March 29, 2006

Ms. Anastasia Shaw  
GEL, Inc.  
2040 Savage Road  
Charleston, SC 29407

**Geotechnical  
Investigation  
Breakwater at  
Marlin Quay Marina  
Garden City Beach, SC  
WPC Project #:  
CHS-06-120**

Dear Ms. Shaw:

As requested, WPC has conducted a geotechnical investigation at the above referenced project. The purpose of this was to determine subsurface conditions with regards to the construction of a breakwater at the site. The following paragraphs present our understanding of the proposed project, describe our exploratory procedures, discuss the subsurface conditions encountered, and present our recommendations regarding geotechnical design considerations for the breakwater. Our recommendations are based upon our understanding of the proposed construction, the subsurface data, and our experience with similar projects and conditions.

#### **PROJECT INFORMATION**

**Overview** Currently, sands are being deposited by coastal water action between an existing floating dock and a marsh area at the Marlin Quay Marina in Garden City Beach, SC. The approximate boundary of the sand deposition area is shown in Figure 1 in the report Appendix. A breakwater will be developed between an existing floating dock and a marsh area to protect the marsh area and allow dredging to deepen the channel along the dock.

Marlin Quay Marina  
Georgetown County  
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## EXPLORATION PROCEDURES

**Overview** The field investigation at the site consisted of one (1) Soil Test Boring (STB) (ASTM D1586) to a depth of 39 ft below the existing ground surface. The boring, labeled as B-1, is shown relative to the site in Figure 1 in the report Appendix. Access to the boring location was achieved through use of a barge. The STB was conducted on a sand bar at low tide. Ground surface elevation data at B-1 was unavailable at the time of this report. We recommend the ground surface elevation be confirmed prior to use of the provided soils information in the breakwater design.

**Soil Test Borings (SPT)** The Soil Test Boring (STB) were advanced using mud rotary drilling techniques in accordance with ASTM D5783 *Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices*. The boring was cased to a depth of 10 ft. Soil samples were collected using a standard Split Spoon Sampler in accordance with the methods outlined in ASTM D1586 *"Test Method for Penetration Test and Split-Barrel Sampling of Soils"*. Split spoon samples were obtained on 5 ft intervals starting at a depth of 7½ ft.

The STB record graphically illustrates Standard Penetration Test (SPT) values, groundwater levels, soil descriptions and classification of the subsurface conditions based upon visual examination of the split-spoon samples by a geotechnical engineer using the procedures outlined in ASTM D2487 *"Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)"*. Stratification lines on these records represent approximate boundaries between soil types; however, the actual transition may be gradual. Details of the subsurface conditions encountered by the STB are included in the Boring Log located in the Appendix of this report.

## GEOTECHNICAL FINDINGS

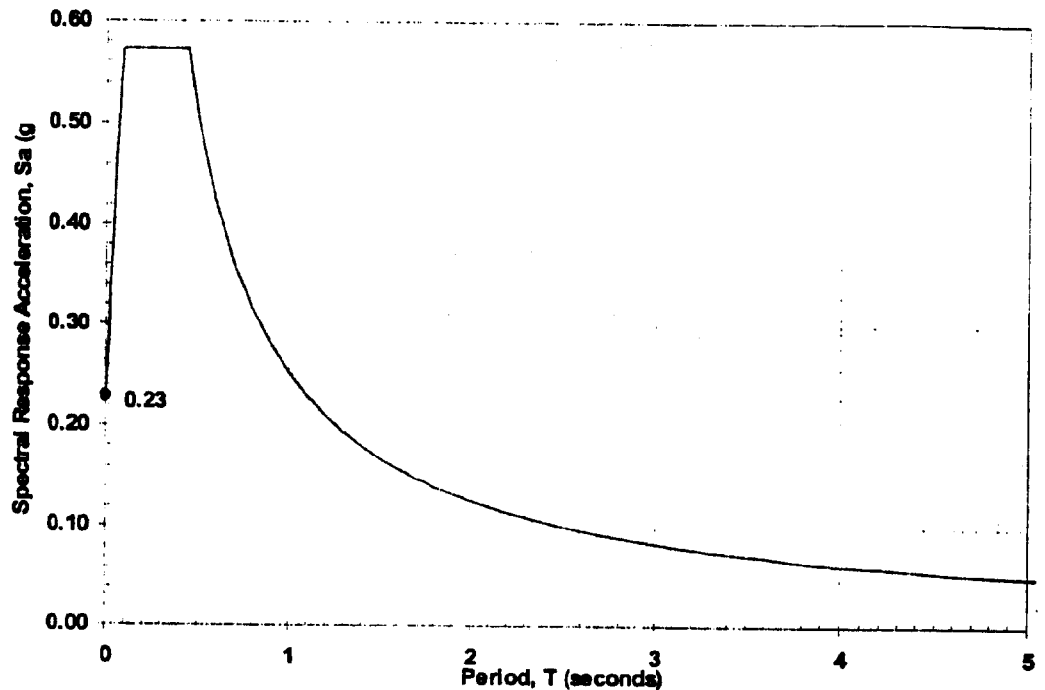
**Subsurface Conditions** In general, the subsurface profile at the boring location consisted of loose clayey sands with shells to a depth of 2 ft from the existing ground surface. Following these sands is a layer of very soft silty clay, known locally as "pluff mud", to a depth of 20 ft. A medium dense sand layer was observed in this very soft clay zone between 13 ft to 16 ft. Following the very soft silty clay are fine sands to the termination of the boring at a depth of 39 ft from the existing ground surface. A small clayey sand layer was observed within these fine sands between 36 ft and 38 ft.

**Groundwater** The groundwater table was not encountered within the boring. We note that boring B-1 was conducted at low tide on a sand bar that is covered with water at high tide.

**Seismic Evaluation** Due to the high seismicity of the coastal South Carolina area, we performed a liquefaction potential analysis for the site. Ground shaking at the foundation of structures and liquefaction of the soil under the foundation are the principle seismic hazards to be considered in design of earthquake-resistant structures. Liquefaction occurs when a rapid buildup in water pressure, caused by the ground motion, pushes sand particles apart, resulting in a loss of strength and later densification as the water pressure dissipates. This loss of strength can cause bearing capacity failure while the densification can cause excessive settlement. Potential earthquake damage can be mitigated by structural and/or geotechnical measures or procedures common to earthquake resistant design.

According to the International Building Code, year 2003 edition (IBC 2003), structures are required to be designed to a design earthquake from a 50 year exposure period with a 2% Probability of Exceedance (PE) (i.e. a 2475 year design earthquake). The 2% PE in 50 year design earthquake has a Moment Magnitude ( $M_w$ ) of 7.3 and a Peak Ground Acceleration (PGA) of 0.23g, as determined from data provided by the IBC 2003 Code. The IBC 2003 Seismic design code is based on the 2000 National Earthquake Hazards Reduction Program (NEHRP) *Recommended Provisions for Seismic Regulations for New Building and Other Structures* (FEMA 368 and 369) and the USGS National Seismic Hazard Mapping Project. Our analysis indicated that isolated layers of the sandy soils encountered below the water table at the site have the potential to liquefy during the design earthquake. According to the IBC 2003 Code, this potential for liquefaction classifies the site as Site Class F.

IBC 2003 provides an exception to the Site Class recommendation for a structure with a fundamental period equal to or less than 0.5 second, which states that a site can be classified as whatever Site Class it would be without considering liquefaction to determine spectral accelerations for structural design. Based on this exception and the collected in situ test data, structures with a period less than 0.5 seconds would be classified as **Site Class D** based on the weighted SPT N values. Figure 2 presents the Site Class D Design Response Spectrum for this site (Note – This is not a Site Specific Evaluation). If the proposed structure has a fundamental period greater than 0.5 seconds, WPC can provide a site-specific response curve. The following are the Site Class D seismic design parameters for the site:  $F_a = 1.25$ ,  $F_v = 2.00$ ,  $S_{DS} = 0.57$ , and  $S_{D1} = 0.25$ .



**Figure 2. Site Class D Design Response Spectrum.**

## RECOMMENDATIONS

**Breakwater Design** Steel sheet piling can be used for the design of the breakwater. Sheet pile design is pile type, shape, embedment depth, depth of retained soil, and the insitu soil properties. At the time of this report, preliminary design information regarding the breakwater sheet piling has not been provided to WPC. Therefore, we have provided insitu soil properties for use in steel sheet piling design (see subsequent section). When preliminary plans for the breakwater sheet piling become available, WPC can provide lateral earth pressure diagrams and review the geotechnical components of the design.

**Insitu Soil Properties** Using the Standard Penetration Test (SPT) N values from the available borings and available correlations within the technical literature, we have determined typical soil properties for the various soil layers for use in sheet pile design. The recommended soil property values for sheet pile design for each soil layer are presented in Table 1.

We note that insitu soil properties based on SPT N values can vary by as much as 20%. Variations of this magnitude may significantly affect sheet pile design values. WPC can review the sheet pile lateral earth pressure calculations upon request.

**Table 1. Recommended Soil Properties for Sheet Pile Design.**

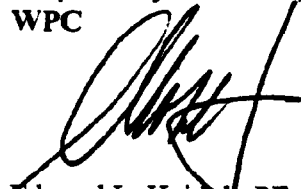
Soil Layer	Depth <sup>10</sup> (ft)	Soil Property <sup>1</sup>							
		$N_{ave}$ <sup>2</sup> (bpf)	$\gamma_t$ <sup>3</sup> (pcf)	$\phi$ <sup>4</sup> (°)	$s_u$ <sup>5</sup> (psf)	$\delta$ <sup>6</sup> (°)	$c_a$ <sup>7</sup> (psf)	$K_a$ <sup>8</sup>	$K_p$ <sup>9</sup>
Sand (SC)	0-2	-	105	30	-	17	-	0.33	3.00
Clay (CH)	2-13	1	95	-	100	-	75	1.00	1.00
Sand (SP)	13-16	19	110	33	-	17	-	0.29	3.39
Clay (CH)	16-20	WOR	95	-	100	-	75	1.00	1.00
Sand (SP)	20-39	21	115	35	-	17	-	0.27	3.69

**NOTES:**

1. Soil properties determined from average N values and available technical literature correlations.
2. Average SPT N value.
3. Total unit weight. For purposes of design,  $\gamma_{total} = \gamma_{moist}$  and  $\gamma_{sub} = \gamma_{total} - \gamma_{water}$ .
4. Effective friction angle.
5. Undrained shear strength.
6. Interfacial friction angle with steel sheet piling.
7. Interfacial adhesion with steel sheet piling.
8. Coefficient of Active Earth Pressure.
9. Coefficient of Passive Earth Pressure.
10. Depth below existing ground surface.

WPC appreciates the opportunity to be of service to you on this project. This report is for the sole use of this project and should not be relied upon otherwise. If you have questions concerning the contents herein, please contact us.

Respectfully submitted,  
WPC



Edward L. Hajduk, PE  
Senior Geotechnical Engineer

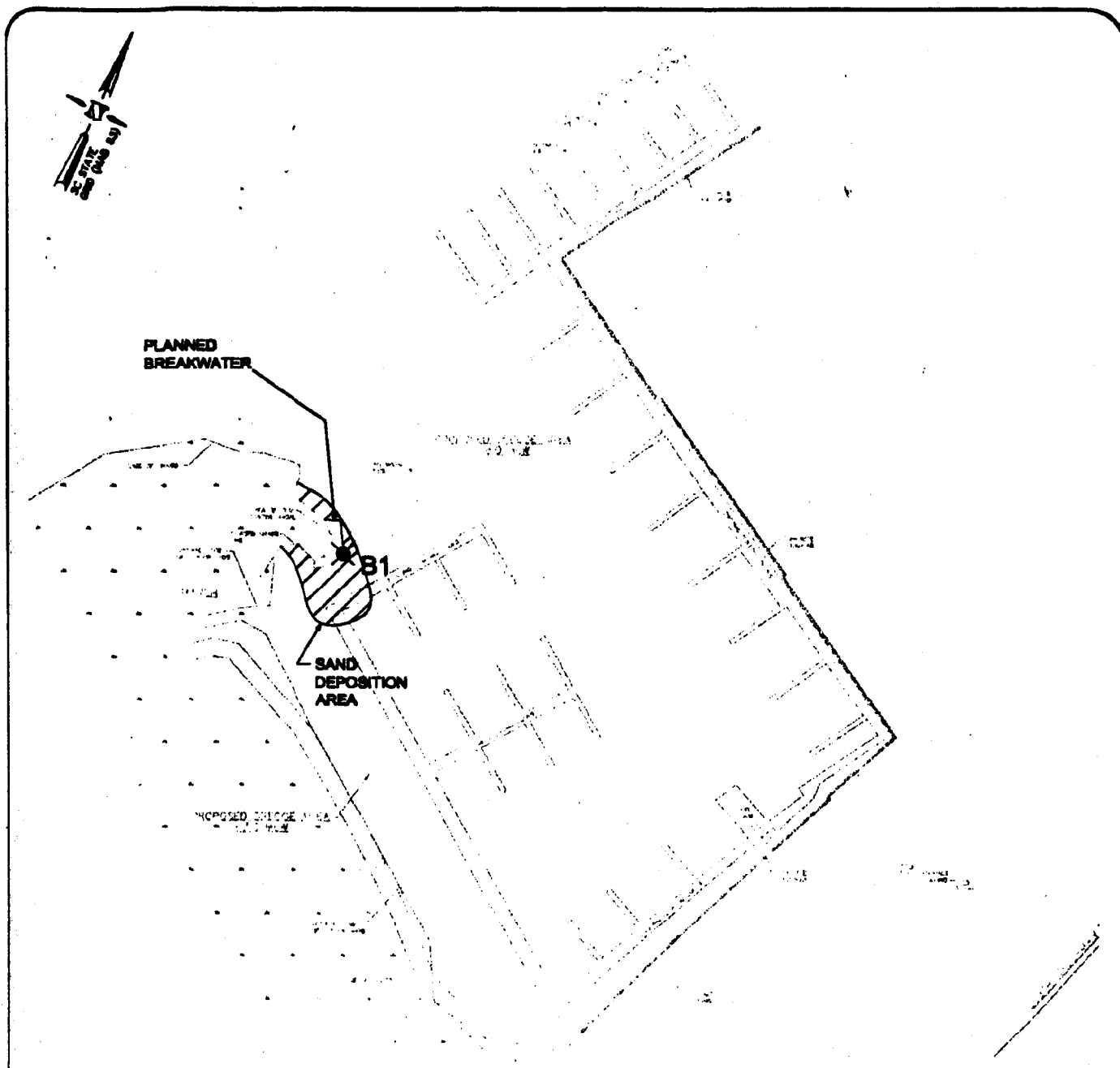
cc: Mr. Eddie Porcher, PE; Stantec Consulting Services, Inc.

Attachments: Figure 1. Test Location Plan





**FIGURE 1. TEST LOCATION PLAN**



# **LEGEND**

★ SOIL TEST BORING (B-1)

Marlin Quay Marina  
Georgetown County  
P/N #2004-1R-218 (modification)  
Sheet 15 of 15

Drawn By: SC  
Approved By: EH  
Project Number:  
CHS-08-120  
Date: 03.28.08  
Scale: NTS

**WPC** ENGINEERING, ENVIRONMENTAL  
& CONSTRUCTION SERVICES  
1017 Chuck Dewley Boulevard  
Mt. Pleasant, SC 29464  
tel. 843.884.1234  
fax. 843.884.9234  
www.wpceng.com

**MARLIN QUAY MARINA  
GARDEN CITY BEACH, SC**

**FIGURE 1. TEST LOCATION PLAN**